

Bacterial Leaf Scorch Affects New Jersey State Tree

Recent surveys indicate that **Bacterial Leaf Scorch (BLS)** of northern red oak is widespread within New Jersey (see map) with many communities experiencing a high disease incidence. **BLS** is considered a threat not only to the state tree, northern red oak, but also to pin and scarlet oaks and other urban trees such as sycamore and elm. The disease in oaks has been observed from southern New York to Florida, and **BLS** has been estimated to occur in more than 50 percent of some landscape oak plantings.

BLS is caused by the bacterium, *Xylella fastidiosa*, which colonizes and physically “clogs” the tree’s water conducting tissues or xylem. Water transport becomes disrupted in roots, branches, and leaves due to large amounts of multiplying bacteria and their by-products. The presence of the bacteria may also trigger a reaction in the tree that plugs the xylem, further impeding water transport.

X. fastidiosa is transmitted to healthy trees by leafhopper and spittlebugs and possibly other xylem feeding insects. These insects acquire the bacteria when they feed on infected trees and possibly other hosts. Many common herbaceous plants such as goldenrod, blackberry, alfalfa, clover, and some grasses, frequented by these insects, also may serve as reservoirs for *X. fastidiosa*.



Colored area depicts where high concentrations of **BLS** have been reported in oak.



Photo 1. Numerous oak branches with leaf color change beginning in mid-summer suggests **BLS** infection.



Photo 2. Leaf tissue discoloration is seen progressing toward the midrib and petiole with a “water-soaked” zone between live and dead tissue.

The presence of the bacterium in vascular tissue can only be identified through microscopic or serological tests. **BLS**, however, can be diagnosed based on time of symptom development, leaf color change, and the annual progression of symptoms throughout the crown. Symptoms of **BLS** start to appear in mid-summer and continue until fall (Photo 1). Leaves on diseased trees begin to dry along leaf margins, and death of the leaf progresses slowly downward toward the midrib and petiole. Eventually, **BLS** affected oak leaves show a distinct transition zone between the margin of dead leaf tissue and healthy tissue. This intermediate transition zone appears dull, pale green in color, and has a “water-soaked” appearance (Photo 2). Finally, the entire leaf dies and turns brown. Symptom development may be hastened during periods of above normal temperatures. Also be cautious when distinguishing **BLS** symptoms from normal leaf color change toward the end of summer.



*Photo 3. First and second year **BLS** infection where only one or two main branches show leaf symptoms.*



*Photo 4. Numerous main branches with **BLS** leaf symptoms on a tree infected more than two years.*



*Photo 5. Cliff Pfeider, Moorestown Department of Public Works, points out leaves on individual oak branches that synchronously show **BLS** symptoms.*

Typically, during the first and second year of **BLS** infection, leaf symptoms are only found on one or two main branches (Photo 3). In later years more branches begin to show **BLS** symptoms (Photo 4). Commonly, all leaves on individual **BLS** infected oak branches are affected at once (Photo 5). Even though some leaves do fall following death, many leaves remain until autumn.

Young, small-diameter oaks may only live up to four years following onset of **BLS** infection. Older large trees, however, may survive up to 10 years and typically have numerous dead branches in their canopy. Dead branches or dieback can be extensive throughout the entire crown (Photo 6). Dieback occurs when terminal ends of branches die progressively inward each year. It is important to remember that a tree can harbor long-term or chronic **BLS** infection; but eventually other factors, such as secondary pathogenic canker and decay fungi and/or wood-boring insects, invade the stressed tree contributing to decline. Trees become unsightly and possibly hazardous, necessitating their removal.

WHAT TO DO:

Currently, there is no known direct cure for **BLS**. Injecting diseased trees with antibiotics reduces symptom development but cannot eliminate the pathogen, and injections are expensive and must be repeated. Tree life, however, may be extended by improving general tree health. It is recommended that soils where young, smaller-diameter oaks are growing be tested for pH and nutrients and amended accordingly. Irrigation and pruning needs also should be monitored regularly. Urban oaks need to be surveyed yearly to determine early **BLS** infection when symptoms are limited to one or two branches. These branches can be therapeutically pruned well below symptomatic leaves, possibly preventing or slowing the spread of the pathogen in the tree. Paying close attention to symptom development through timely surveys, as mentioned above, can minimize the effect of **BLS** on landscape oaks.



*Photo 6. A mature oak infected over several years with **BLS** showing numerous dead branches.*

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